Request for Information—Currently Accepting

A Request for Information (RFI) is a request for relevant technical information from a wide range of industries made to determine topics of future research. On the basis of technical information received through the RFI, Space Exploration Innovation Hub Center will narrow down the list of topics and issue Requests for Proposals (RFPs) to those who wish to join Space Exploration Innovation Hub Center.

Open Innovation Hub Projects
Studies of proposals selected from RFPs being conducted.

Purposes and descriptions of three research types

- **Solution-creating Research:**
  Projects with a clear technological target, aiming for commercialization within 3 years of the research being completed
  Research period: up to 3 years
  Total research budget: up to 300 million yen
- **Idea-incubating Research:**
  Projects implemented to discover new technologies and ideas
  Research period: up to 1 year
  Total research budget: up to 5 million yen
- **Challenging Research:**
  (special entries within idea-incubating research)
  Projects implemented to discover groundbreaking ideas through free thinking
  Research period: up to 1 year
  Total research budget: up to 3 million yen

Intellectual property management system
Japan Aerospace Exploration Agency (JAXA) believes that it is important to build an open research system that invites talent and knowledge from various fields and has made necessary system improvements. Policy for handling intellectual property is an important factor determining the success and failure of promoting the participation of talented researchers and diverse businesses. Thus, unlike the traditional system adopted at JAXA, by providing JAXA portion of maintenance costs, such as application fees, the cost of implementation can be made exempt for intellectual property. The management of intellectual property is being promoted.

Cross-appointment system
The cross-appointment system promotes the appointment of domestic and international researchers. The system is therefore designed to allow researchers to work without constraints relating to their affiliations. Researchers are employed by businesses, universities, and research institutions (i.e., their affiliations) and JAXA (i.e., their dispatched workplace) and work in research and development, taking on their roles at each institution. To that end, an employment system of cross-appointment was developed at JAXA in March 2015. Staff are already being hired using this system at Space Exploration Innovation Hub Center.

The opportunity to participate is open to researchers from Japan-based companies, universities, and research institutions.
All application documents must be submitted in Japanese.

The “Space Exploration Field”
— JAXA’s R&D Facility for Open Innovation and Space Exploration Projects —

The Space Exploration Field, which began operations in May 2017, has been the site of many research activities of the Hub’s collaborative research and JAXA projects and has produced valuable research results and contributed to the realization of JAXA projects.
The field is a 400-square-meter area covered with 425 tons of silica sand features. It is one of the world’s largest indoor facilities of its type.
This simulated lunar terrain is used for running and landing tests of exploration robots and spacecraft and can also be used to simulate the lighting environment provided by the moon through the shining of artificial sunlight.
We will continue to provide research and development facilities for companies, universities, and research institutes, aiming to be a central facility for space exploration research and development in Japan.
Tours are available.
We provide many visitors with the opportunity to tour the space exploration facility.

Space Exploration Innovation Hub Center was supported by Japan Science and Technology Agency (JST) from June 1, 2015 to March 31, 2020 as “Open Innovation Hub for Expanding Humanosphere and the Domain of Human Activity through Solar System Frontier Development (Open Innovation Hub)”

Space Exploration Innovation Hub Center (TansaX), Japan Aerospace Exploration Agency
3-1-1 Yoshinodai, Chuo-ku, Sagamihara-shi, Kanagawa 252-5210
https://www.ihub-tansa.jaxa.jp/english/index e-mail: SE-forum@jaxa.jp
@JAXA_TansaX

JTX1712E3

SPACE EXPLORATION
INNOVATION HUB CENTER

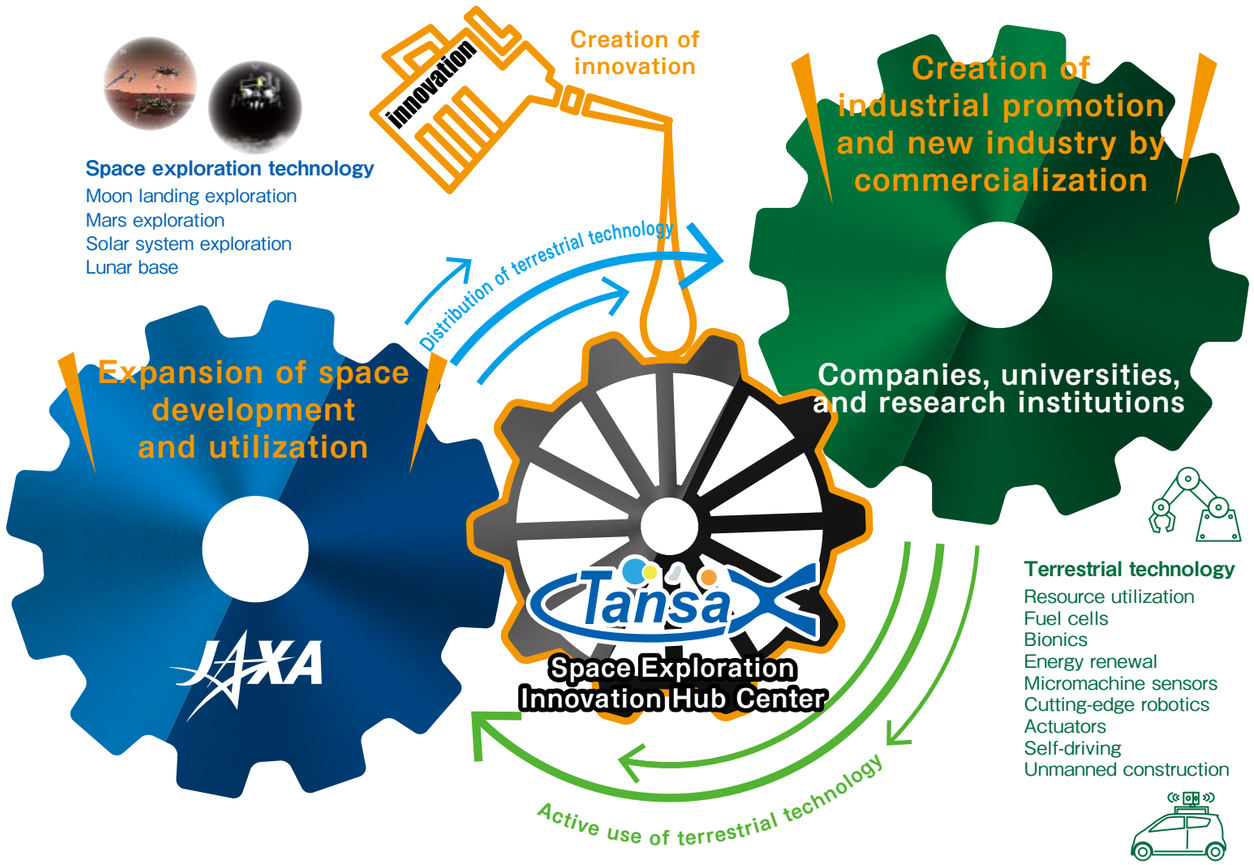
Japan Aerospace Exploration Agency
Space Exploration Innovation Hub Center

As Japan and other countries around the world are rapidly expanding their lunar and planetary exploration, what is the ultimate goal of space exploration? I participated in the formulation of “Space Vision 2050” announced by The Japan Society for Aeronautical and Space Sciences last year. I predicted that 30 years from now, in the future, space near the Earth will be a part of global society as a place of human activity, and human beings will regularly stay on the Moon and Mars, and people will routinely travel to space as tourists. Such an affluent world does not appear suddenly, but is supported by gradual development in various fields.
While space exploration today is supported by many research activities and government support, the role of industry will become very important in the future. If companies are not able to get into space activities and start new businesses, there will be no hope of a sustainable space program. However, it's also true that the bar to entry into space is high for the average company. Therefore, JAXA Space Exploration Innovation Hub Center (hereinafter “Exploration Hub”)'s policy is “Dual Utilization,” which focuses on the feasibility of commercialization/innovation on the ground, with the aim of applying it to future space exploration, and we believe that this approach will be extremely effective in bringing sustainable growth to space development as industry sequentially expands its role.
With this excellent approach, over the past five years we have achieved a wide range of research and development results in the areas of Exploration technology in a wide range of unexplored areas, Automatic and autonomous exploration technology, In-situ resource utilization (ISRU) technology, and Common technology, from the challenge of embryonic new technologies to the realization of technology demonstrations in space, and we are gradually realizing our target of open innovation. On the other hand, the attempts so far have not yet been on a large enough scale, and there will be a need to regularize the activity of pursuing innovation and ensure that it is applied to the expansion and exploration of the business by companies. We would like to see the activities to bring together a diverse range of human resources and research and development themes in the hub promoted as Phase 2 activities of Exploration Hub. We look forward to the participation and cooperation of a wide range of people from industry, government, and academia.

Director of Space Exploration Innovation Hub Center
Funaki Ikkoh

TansaX : TansaX is a nickname of Space Exploration Innovation Hub Center. TansaX includes a meaning of the creation of “X,” i.e., “unexpected things,” through our research and development for Tansa*. TansaX is also the acronym for “Technology Advancing Node for SpAce eXploration.”
* “Tansa” means “exploration” in Japanese.

TansaX Logo : The logo symbolizes our aim to expand the humanosphere and the domain of human activities within the Solar System. “X” symbolizes a rocket engine nozzle and projects the image of flying freely and vigorously from the Earth (blue) to the Moon (yellow), the asteroids (gray), and Mars (red) in the Solar System.



Four areas of research

Exploration technology in a wide range of unexplored areas

With traditional large spacecraft, space exploration takes a lot of time and cost. Since opportunities for exploration are limited, the locations for exploration also become limited. Therefore, by switching from a strategy of focusing all efforts in one area to one of distributed and cooperative works in wide areas, and by distributing functions through multiple small spacecrafts (exploration robots), wide-ranging yet in-depth exploration of unexplored areas can be actualized, leading to an innovation in exploration methods. For example, we aim to develop an innovative technology, in which multiple small robots are launched in one rocket, and are placed in craters, vertical caves, etc. on the Moon or Martian surface to explore the areas all at once. Distributed robots can cooperate with each other, and engage in high-level observation, cooperative work, location identification, and with a reliability that cannot be achieved with one robot. We can create our own unique exploration program through fusion of robots technologies, which are the pride of our nation, and achieve a global leadership role in space exploration. Applications to the building of a new observation system for natural phenomena, such as volcanoes, typhoons, disasters, etc., measurement and examination of large structures and plants in factories, and a wide-range of automatic observations on Earth are expected to flow from this program.

Cooperative exploration with biomimetic robotics (conceptual drawing)

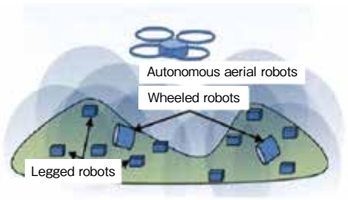


Image of observation and monitoring of volcanic areas

Automatic and autonomous exploration technology

We aim to acquire the construction technology required for a manned base to be constructed on the Moon and Mars, and the infrastructure technology to support activities in the future. Since a large number of people cannot be sent to the Moon and Mars, construction of the bases will be done largely on an unmanned basis. The challenge is to step away from the total-command system from Earth, gather and acknowledge information of the self-position and the surroundings on site, and to acquire the skills to operate efficiently. Various technologies such as ICT technology and environment recognition technology are necessary to achieve this, and application of terrestrial technology that has been proven on Earth is expected. From these developed technologies, humans and machines are efficiently integrated, and new developments, such as remote operations on Earth, can be considered.

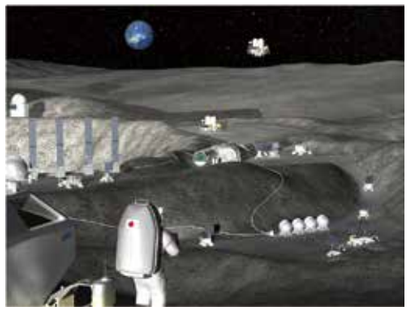
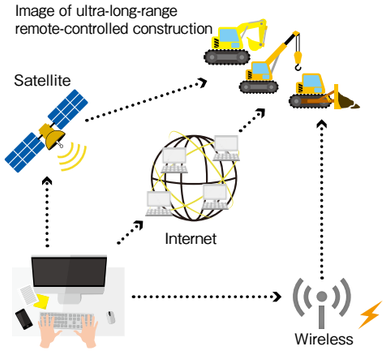


Image of unmanned construction of a manned base on the Moon.



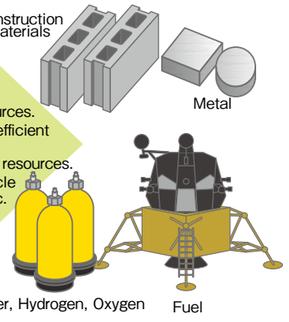
In-situ resource utilization (ISRU) technology

The transportation costs to the Moon and Mars are about 10 times higher than those to low Earth orbit. Therefore, for sustainable activities on the Moon and Mars, a paradigm-shift to “procuring necessities on site” becomes necessary.
The goal is to acquire a system that can efficiently produce essential goods and food using local resources, energy and materials that are no longer needed.
Even on Earth, these technologies will be applied toward effective use of untapped low-quality resources, production of goods with low environmental impact, local production of resources on islands and in remote areas, and efficient food production.

Space farming (conceptual drawing)

Moon's surface soil, regolith (the photograph shows simulated lunar soil)

▶Technology to effectively use low quality resources.
▶Technology for efficient mining and transportation of resources.
▶Reuse and recycle technologies, etc.



Common Technology

We challenge the acquisition of elemental technologies commonly required for “Exploration technology in a wide range of unexplored areas”, “Automatic and autonomous exploration technology”, and “In-situ resource utilization(ISRU) technology”, such as energy technologies (e.g. heat and power), technologies to measure the surrounding area essential for automatic driving, etc., and information and communication technologies such as IoT.
Examples include high-performance, secure all-solid-state lithium-ion battery, long-distance optical communication system using optical disc technology, ultra-sensitive 2D simultaneous image sensor, and low-cost radar with no mechanical rotating parts and so on. These technologies have high affinity to terrestrial technology, and they are expected to create innovation both in Space and on Earth.